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BEFORE THE SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE OF THE SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
ON
TITLE IX AND OPPORTUNITIES FOR WOMEN IN SCIENCE, MATHEMATICS AND ENGINEERING

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I am Marcia Greenberger, Co-President of the National Women's Law Center. Thank you for the invitation to appear before you today to discuss the applicability of Title IX of the Education Amendments of 1972 (Title IX) to opening up opportunities for women interested in pursuing degrees and careers in mathematics, engineering and the hard sciences. We are especially pleased to have this opportunity because this year is the law's 30th anniversary. While much progress has been made in the last three decades, much remains to be done to ensure that women have equal access and opportunities in all areas of education.

The Center is a non-profit organization that has worked since 1972 to advance and protect the legal rights of women and girls across the country. The Center focuses on major policy areas of importance to women and their families, including education, employment, health and reproductive rights, and economic security – with particular attention paid to the concerns of low-income women. Founded in the year that Title IX was passed, the Center has devoted much of its resources to ensuring that the promise of Title IX becomes a reality in all aspects of education.

Title IX was enacted in 1972 as a broad proscription against discrimination in any federally funded education program or activity. It states simply:

> *No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of or be subjected to discrimination under any education program or activity receiving Federal financial assistance.*[1]

Title IX applies to most elementary and secondary schools and colleges and universities.

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It also applies to programs and activities affiliated with schools that receive federal funds. It was intended to ensure equal opportunity for women and girls in all aspects of education – from access to higher education, to equal opportunities and fair treatment in elementary and secondary classrooms, to equal opportunities in athletics programs. In passing Title IX, Congress recognized that it is through education that women have the means to a better economic future for themselves and their families. Congress' vision has borne fruit: thirty years after enactment of the law, we have more women doctors and lawyers, as well as women athletes winning medals and trophies – all of whom help defy gender stereotypes about the interests and abilities of women and girls.

I. Women and Girls are Underrepresented in Math, Science, Engineering and Technology.

Despite this progress, women remain underrepresented in the traditionally male fields of math, science and engineering. Gender disparities in math and science start small and grow as students advance in school, with boys outperforming girls on standardized tests and participating in math and science classes at higher rates in high schools, and men majoring in math and science at higher rates than women at the post-secondary level.[2] Similarly, at both the high school and post-secondary levels, female students are less likely than their male counterparts to receive training in computers and technology beyond the traditionally female areas of word processing or data entry.[3] This underrepresentation is particularly problematic at this time in our history, when proficiency in science, math and the information sciences is critical to jobs in a technological society.

While women have made remarkable progress in pursuing college degrees, they are still underrepresented in the areas of math, science and engineering -- underrepresentation that grows larger at the master's and doctorate degree levels. In fact, the only science in which women receive bachelors' degrees in rough proportion to their presence in the student body is the biological /life sciences, where women receive 58% of bachelor's degrees and 55% of master's degrees. But even in this field, women lose their majority to men at the doctorate level, with women receiving only 44% of doctorate degrees.

And in other fields, the news about women's participation is worse. For example:

- In mathematics and physical sciences women are working towards parity with men at the bachelor level where women receive 47% of bachelor's degrees in mathematics and 40% of bachelor's degrees in physical sciences. However, women are awarded only 25% of doctorate degrees in each of these areas.

- In computer and information sciences, there is actually a downward trend. The number of women receiving bachelor's degrees in computer and information sciences reached a high of 37% in 1984, but dropped to 28% in 1999-2000.

- The most disturbing disparity lies in engineering, where women receive only 18% of

bachelor's degrees, 21% of master's degrees, and 15% of doctorate degrees. (See attached charts.)

These disparities in the student body are mirrored by similar gender disparities in the employment of female professors in math, science and engineering. For example, in engineering, women are only 8.9% of tenured or tenure-track faculty, and only 4.4% of full professors.[4] They are only 25% of the full-time instructional faculty in natural sciences.[5] (See attached chart.)

As Representative Patsy Mink stated in 1971, "discrimination against women in higher education is one of the most damaging forms of prejudice in our Nation for it deprives a high proportion of our people of the opportunity for equal employment and equal participation in national leadership."[6]

Moreover, while girls the gender gap is narrowing in mathematics and science at the high school level, girls continue to lag behind their male counterparts in several key areas. For example:

- Girls score 35 points below boys on the math portion of the SAT.[7]

- Across all racial and ethnic groups, males are more likely than females to attain high scores on the AP biology examination and the AP calculus examination.[8]

- In 1997, girls comprised only 37% of students enrolled in Advanced Placement (AP) computer science classes across the nation, and in twelve states comprised less than 20% of the students.[9]

- Girls are less likely than boys to take math courses beyond algebra II, and boys far outnumber girls in physics and computer classes.[10]

II. <u>This Underrepresentation has Significant Consequences for Women.</u>

The gender disparities in math, science, engineering and technology have a deep impact on the earning power and career prospects of women. For example:

- Women employed in science are most likely to work in natural sciences, where they comprise 35% of the workforce. The annual mean income for natural sciences occupations is $47,790. This is significantly less than the annual mean income for computer and math occupations -- $58,050 -- or for engineering (including architecture) occupations, $54,060. Women comprise only 30% of the computer and math workforce and a meager 11% of the engineering workforce.[11]

- Even where women and men have attained the same degree level, salary differentials persist.

Women with a bachelor's degree in an area of science or engineering, earn 35% less than similarly situated men, and those with a doctorate degree earn 26% less than their male peers.[12]

- The gap between the median annual salaries of men and women in science and engineering occupations has increased over time; in 1999, women earned an average of $14,000 less than their male counterparts, compared to $10,000 less in 1993.[13] (See attached chart.)

Indeed, a 1997 report issued by the U.S. Department of Education noted several trends that inhibit educational and career opportunities for women, including women's lower number of degrees in computer science, engineering, physical science, and math compared with men, and the underrepresentation of women in jobs in scientific fields.[14]

III. Women and Girls in Math, Science, Engineering and Technology Face Persistent Barriers.

This pattern of underrepresentation at both the secondary and post-secondary levels of education is directly linked to the continuing barriers that female students face in these programs. For example, a recent study found that 71% of male teachers believed that male students were more interested in the mechanics of computer technology, and were more likely to attribute boys' success in technology to talent while dismissing girls' success as due to luck or diligence.[15] And deficient career counseling in secondary schools has been found to reduce women's entry into science and engineering at the university level.[16] Additionally, some research has demonstrated that in post-secondary programs, female students transfer out of science, engineering and technology-related majors more often than their male counterparts, in part due to experiences of gender bias and low faculty expectations.[17]

Further, many of our young women do not enjoy equal access to math, science or technology-related opportunities because of decisions made by their education systems about the placement of such opportunities. For example, an investigation conducted by the National Women's Law Center into educational opportunities for female students in New York City's vocational and technical high schools found that none of the four predominantly female vocational schools offer any AP courses in Calculus, Statistics, Biology, Chemistry, Physics, or Computer Science, although such courses are provided at the predominantly male vocational schools. According to our calculations, approximately 67% of male vocational students, but only 35% of female vocational students, attend a school that offers at least one math or science AP course. Similarly, the New York City Board of Education has implemented Cisco Networking Academies, which lead to industry certification in computer networking, at some of the vocational high schools, but has not placed this program in any of the predominantly female schools.[18]

Thus, a 2000 report of the United States Commission on Civil Rights found that

"[t]hrough lack of counseling; stereotypical socialization; discouragement; less aggressive inclusion of parents in designing programs; gender-biased teaching styles, resources, and testing; and other barriers, girls are steered from math, science, engineering, and other technical fields."[19] Similarly, the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development concluded that same year that "[a]ctive discouragement … contribute[s] to girls' lack of interest in [science, engineering and technology] careers."[20]

Women faculty members also face barriers at their institutions. A recent study on the status of female professors in science at Massachusetts Institute of Technology (MIT) drew national attention when the university publicly acknowledged discrimination against women faculty. In 1994, tenured women faculty in the School of Science at MIT formed a committee to investigate whether their individual experiences of veiled discrimination represented a broader framework of inequality.[21] The committee's report relied upon and analyzed data and interviews conducted with women faculty and department heads.[22]

The report found that tenured women faced "patterns of difference," evidenced by consistently lower salaries than their male peers, unequal access to resources and persistent exclusion from any substantive power at MIT.[23] The report also revealed a correlation between these "patterns of difference" and the tenured women's consistent reports of feeling excluded, disempowered, "invisible" and "marginalized" within their departments as their careers progressed.[24] According to the report, "as of 1999, there ha[d] never been a woman department head, associate head, or center director in the School of Science in the history of MIT." [25]

Unfortunately, despite evidence of the very real barriers that women and girls continue to face in these fields, gender stereotyped arguments about the abilities and interest of women and girls persist. Allegations continue to be made today, for example, that males outnumber females in doctoral degrees in fields such as physics and engineering because their spatial and mechanical aptitudes are superior to those of women, and that sex hormones are the cause of these differences between males and females.[26] These types of arguments have also been made repeatedly in an effort to deny women equal athletics opportunities, where critics of Title IX have asserted that women are less interested in sports than men. However, as Congress and the courts have consistently recognized, Title IX was enacted in order to remedy discrimination that results from stereotyped notions of women's interests and abilities and the law must be vigorously enforced to eradicate those discriminatory assumptions.

IV. Title IX Enforcement is Critical to Eliminating Barriers.

As this information demonstrates, vigorous enforcement of Title IX is necessary to ensure that discrimination on the basis of sex is stamped out. The Title IX regulations, promulgated in 1975, require federally funded education programs to take a variety of steps to prevent and address sex discrimination.[27] In particular, education programs may not

discriminate in recruiting, counseling, admissions or treatment of students. For example:

- Programs must ensure that counseling is not discriminatory and does not steer female students away from non-traditional areas, such as math and science.

- Programs must designate an employee to ensure Title IX compliance and to investigate complaints of sex discrimination.

- Programs must implement and disseminate a written policy prohibiting sex discrimination, with a process for filing grievances.

Importantly, the Title IX regulations require that if a program finds that a particular class is disproportionately male or female, that program must make sure that this is not the result of sex-biased counseling or the use of discriminatory counseling or appraisal materials.[28] Thus, math, science, engineering and technology-related programs have an affirmative obligation to review their own practices and remedy discriminatory practices that lead to underrepresentation of women in these areas.

The Department of Education's Office for Civil Rights (OCR) is recognized as the primary enforcement agency under Title IX. However, OCR has a mixed record on Title IX compliance and enforcement activities relating to women and girls in math and science education. For example, a recent review of OCR's activities indicated that few of OCR's Title IX cases have evaluated female students' access to and participation in science and math.[29] Moreover, it is unclear whether OCR is providing adequate technical assistance in this area. In April 1996, OCR released a "promising practices" document regarding access for women and minorities to math and science programs, to help school districts with an underrepresentation problem devise ways to ensure equal educational opportunity.[30] It is unclear whether OCR continues to make this document available to education programs today as it conducts technical assistance, or whether the underrepresentation of women and girls in math, science, engineering or technology programs is a priority issue for the office.

With its enforcement powers, OCR can effect great changes, but this requires resources and a greater commitment to enforce Title IX in all areas of education. Compliance reviews and other enforcement measures are needed to ensure that schools and programs are meeting their obligations under the law. In fact, OCR could be asked to undertake compliance reviews to determine the causes for women's lower participation in math and science, which decreases even more at the post-secondary level, and to take action to eliminate all forms of sex discrimination. Indeed, in a related area, in June 2002, the Center filed 12 Petitions for Compliance Review with each of the regional offices of OCR, requesting full investigations of the sex segregation in high school vocational and technical programs in specific states.[31] It is our hope that OCR will conduct full investigations and remedy any discrimination that has resulted in barriers to full educational opportunity for young women in these programs. Similar requests for compliance reviews of math, science, engineering and technology programs could generate

beneficial results.

In addition to proactive compliance reviews conducted by OCR, any student or interested group may file a Title IX complaint with the federal government to challenge discrimination in math, science and engineering programs. Individuals whose rights under Title IX have been violated may also be able to bring a federal lawsuit against the education program or institution.

Conclusion

While there has been progress made over the last 30 years under Title IX, many battles still must be fought to eradicate sex discrimination in education and enable women and girls to realize their full potential. Women and girls continue to face unacceptable barriers in the non-traditional fields of math, science, engineering and technology. These barriers must be eliminated, and strong enforcement of Title IX is necessary to open up the door to equal educational opportunity. After 30 years of this important law, we still fall short of the educational landscape that the late Representative Edith Green and former Senator Birch Bayh envisioned when they sponsored Title IX – namely, complete elimination of the "corrosive and unjustified discrimination against women" in education. As long as math, science, engineering and technology remain hostile fields for women, we will not have realized Title IX's promise. We must recommit ourselves today to making the letter and the spirit of the Title IX law a reality across all areas of education.

Thank you very much.

Endnotes

[1] Title IX of the Education Amendments of 1972, 20 U.S.C. § 1681 *et seq*.

[2] National Coalition for Women and Girls in Education, *Title IX at 30: Report Card on Gender Equity*, 37 (June 2002).

[3] *Id*. at 52.

[4] Margaret Mannix, *Facing the Problem*, Prism Journal of Engineering, Vol. 12, No. 2 (October 2002).

[5] U.S. Department of Education, National Center for Education Statistics, Digest of Education Statistics (2001), *at* http://nces.ed.gov/pubs2002/digest2001/tables/dt.235.asp.

[6] 117 Cong. Rec. 2658 (1971).

[7] The College Board, *2001 Profile of College Bound Seniors*.

[8] Educational Testing Service, *Differences in the Gender Gap: Comparisons Across Racial/Ethnic Groups in Education and Work*, pp. 38-39 (2001).

[9] U.S. Department of Education, Office for Civil Rights, *1997 Elementary and Secondary School Civil Rights Compliance Report, National and State Projections* (December 1999).

[10] American Association of University Women, *Gender Gaps: Where Schools Still Fail Our Children*, 13-14 (1998).

[11] U.S. Department of Labor, Bureau of Labor Statistics, *at* http://stats.bls.gov/oes/2000/oes_15Co.htm.

[12] Association of Women in Science, *Salary Differentials controlling for individual characteristics: 1999*, *at* http://www.awis.org/statistics/statistics.html

[13] American Women in Science, *Median Annual Salaries of Men and Women in Science & Engineering Occupations*, *at* http://awis.org/statistics/statistics.html.

[14] U.S. Department of Education, *Title IX: 25 Years of Progress*, 15-16 (June 1997).

[15] American Association of University Women Educational Foundation, *Tech-Savvy: Educating Girls in the New Computer Age*, *at* 24 (2000).

[16] Carolyn B. Ramsey, *Subtracting Sexism from the Classroom: Law and Policy in the Debate Over All-Female Math and Science Classes in Public Schools*, 8 Tes. J. Women & L.1 (1998).

[17] Congressional Commission on the Advancement of Women & Minorities in Science, Engineering and Technology Development, *Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology*, at 31 (September 2000).

[18] *See* National Women's Law Center, Letter to Chancellor Harold O. Levy, August 15, 2002, *at* http://www.nwlc.org/pdf/LevyLetter.pdf.

[19] United States Commission on Civil Rights, *Equal Educational Opportunities and Nondiscrimination for Girls in Advanced Mathematics, Science, and Technology Education: Federal Enforcement of Title IX*, 7 (July 2000).

[20] *Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology* at 2.

[21] *A Study on the Status of Women Faculty in Science at MIT*, MIT Faculty Newsletter, Vol. XI, No. 4, March 1999, *at* http://web.mit.edu/fnl/women/women.html.

[22] *Id*. at 4.

[23] *Id*. at 7.

[24] *Id*. at 7-8.

[25] *Id*. at 12.

[26] Patricia Hausman, Independent Women's Forum, *Plenty of Nonsense, How the Land of Plenty Report Denies Female Scientific Achievement*, 14-15 (November 2000).

[27] 34 C.F.R. Part 106.

[28] 34 C.F.R. 106.36 (c).

[29] *Equal Educational Opportunities and Nondiscrimination for Girls in Advanced Mathematics, Science, and Technology Education: Federal Enforcement of Title IX , at* 65.

[30] U.S. Department of Education, Office for Civil Rights, *Promising Programs and Practices: Access for Women and Minorities to Mathematics and Science Programs and Gifted and Talented Education Programs*, April 1996.

[31] *See* National Women's Law Center, Petitions for Compliance Reviews of High School Vocational and Technical Programs by the United States Department of Education, Office of Civil Rights, Regional Offices, *at* http://www.nwlc.org/details.cfm?id=1138&section=education.